

# SECOND FIVE-YEAR REVIEW REPORT

## Bally Ground Water Contamination Superfund Site

Borough of Bally

Berks County, Pennsylvania

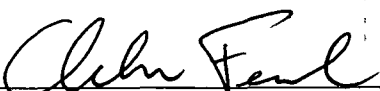
EPA ID#: PAD061105128

Prepared by:

U.S. Environmental Protection Agency

Region III

Philadelphia, Pennsylvania

  
Abraham Ferdas, Director  
Hazardous Site Cleanup Division

6/9/05  
Date

## FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site name: Bally Ground Water Contamination Superfund Site		
EPA ID: PAD061105128		
Region: III	State: PA	City/County: Borough of Bally, Berks County
SITE STATUS		
NPL status: <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify) _____		
Remediation Status (choose all that apply) <input type="checkbox"/> Under Construction <input checked="" type="checkbox"/> Operating <input checked="" type="checkbox"/> Complete		
Multiple OUs?* <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	Construction completion date: May 28, 1999 (PCOR)	
Has site been put into reuse? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		
REVIEW STATUS		
Lead agency: <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency _____		
Author name: Mitch Cron		
Author title: Remedial Project Manager	Author Affiliation: EPA Region III	
Review period: January 4, 2005 – June 8, 2005		
Date(s) of site inspection: April 26, 2005		
Type of review: <input checked="" type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead <input type="checkbox"/> Regional Discretion		
Review number: <input type="checkbox"/> 1 (first) <input checked="" type="checkbox"/> 2 (second) <input type="checkbox"/> 3 (third) <input type="checkbox"/> Other(specify) _____		
Triggering action: <input type="checkbox"/> Actual RA Onsite Construction at OU # _____ <input type="checkbox"/> Actual RA Start at OU# <input type="checkbox"/> Construction Completion <input checked="" type="checkbox"/> Previous Five-Year Review Report <input type="checkbox"/> Other (specify) _____		
Triggering action date: June 8, 2000		
Due date (five years after triggering action date): June 8, 2005		

## **FIVE-YEAR REVIEW SUMMARY FORM, CONT'D.**

### **Issues:**

- In 2003, the Site-related contaminant, "1,4-dioxane", was identified in Bally Municipal Well Number Three, and in the Bally water system.
- In 2005, Site-related contaminants in vapor form were identified beneath the building slab of the former Bally Engineered Structures facility (the source of contamination at the Site).
- The Record of Decision (ROD) required that a private well located in Bally ("Gehman residence") be properly abandoned. This well has not been properly abandoned.
- The following change should be made to the ground water monitoring program: one monitoring well should be added to the ground water monitor program ("97-23D").

### **Recommendations and Follow-up Action:**

- The Potentially Responsible Party (PRP) is currently preparing a Focused Feasibility Study (FFS), pursuant to an Administrative Order on Consent, to address the 1,4-dioxane issue.
- The PRP is currently performing a vapor intrusion investigation at the Site, in accordance with an EPA-approved workplan.
- The PRP should locate and properly abandon the "Gehman residence" private well.
- The following change should be made to the ground water monitoring program: one monitoring well should be added to the ground water monitor program ("97-23D").

### **Protectiveness Statements:**

The remedy at the site is not protective because 1,4 -dioxane, a Site-related contaminant, was identified in Bally's municipal water system in 2003. The PRP is currently preparing a FFS to address feasible treatments for the contaminant and the feasibility of installing a new supply well in an uncontaminated area. Selection of the remedy will be performed by EPA in accordance with the NCP. The PRP has supplied bottled water to residents that requested it.

Vapor intrusion is another issue that needs to be resolved before the site can be protective. The PRP will perform a vapor intrusion investigation at the Site in accordance with the EPA approved work plan.

The remedy outlined in the 1989 ROD and subsequent ESD has been implemented, with the exception of properly abandoning one residential well, which is currently not in use. The well will be properly abandoned by the PRPs in the near future.

### **Other Comments:**

None.

## EXECUTIVE SUMMARY

The remedy for the Bally Ground Water Contamination Superfund Site in the Borough of Bally, Pennsylvania included abandoning appropriate existing private wells and implementing institutional controls on the use of operable private wells and the construction of new wells; performing ground water and surface water monitoring to measure contaminant concentrations and migrations effected by removing contaminated ground water from the aquifer through the continuous pumping of Municipal Well Number Three; treating the extracted ground water by one of the treatment options retained for consideration and discharging the treated water from Municipal Well Number Three to the adjacent stream or into the Borough of Bally potable water system, as needed, to provide a suitable alternative water supply; and performing necessary additional studies in the pre-design phase to evaluate the configuration of any additional ground water extraction wells required.

The Site achieved construction completion with the signing of the Preliminary Close-Out Report on May 28, 1999. The trigger for this five-year review was the date of the previous Five-Year Review: June 8, 2000.

The assessment of this Five-Year Review found that the remedy was constructed in accordance with the requirements of the Record of Decision (ROD), with the exception of the abandonment of an existing private well. The private well is not currently being used; therefore, this condition does not affect the protectiveness of the remedy. An Explanations of Significant Differences (ESD) was issued for the Site in 1990. The ESD was issued to clarify EPA's position with regard to the control of Volatile Organic Compound emissions from the air-stripper ground water treatment system constructed at Municipal Well Number Three.

Based on the results of the Five-Year Review process, two issues that require resolution have been identified that impact the protectiveness of the remedy: the identification of 1,4-dioxane in the Bally water system, and the identification of vapor intrusion as a potential issue of concern at the Site

## Table of Contents

<b>I. Introduction.....</b>	<b>1</b>
<b>II. Site Chronology .....</b>	<b>2</b>
<b>III. Background .....</b>	<b>2</b>
Physical Characteristics .....	2
Land and Resource Use .....	4
History of Contamination .....	4
Initial Response.....	5
Basis for Taking Action .....	6
<b>IV. Remedial Actions.....</b>	<b>7</b>
Remedy Selection .....	7
Remedy Implementation .....	8
System Operation/Operation and Maintenance .....	11
<b>V. Progress Since the Last Five-Year Review .....</b>	<b>11</b>
<b>VI. Five-Year Review Process .....</b>	<b>13</b>
Administrative Components.....	13
Community Involvement .....	13
Document Review .....	14
Data Review .....	14
Site Inspection.....	18
Interviews .....	18
<b>VII. Technical Assessment.....</b>	<b>19</b>
<b>VIII. Issues .....</b>	<b>22</b>
<b>IX. Recommendations and Follow Up Actions .....</b>	<b>23</b>
<b>X. Statement on Protectiveness. ....</b>	<b>24</b>
<b>XI. Next Five-Year Review.....</b>	<b>24</b>

### Tables

- Table 1: Chronology of Site Events
- Table 2: Issues
- Table 3: Recommendations

### Attachments

- Attachment 1: Site Map
- Attachment 2: Monitoring well network
- Attachment 3: Site photographs – April 26, 2003
- Attachment 4: Risk Assessment information prepared by EPA Region III Risk Assessor
- Attachment 5: Table 2 from the ROD (Site performance standards)

## Acronyms

AHI	American Household Inc.
AOC	Administrative Order on Consent
AST	Aboveground Storage Tank
BES	Bally Engineered Structures, Inc.
BCC	Bally Case and Cooler Company
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CD	Consent Decree
CEC	Civil and Environmental Consultants, Inc.
CSF	Cancer Slope Factor
DCE	1,1-dichloroethene
EPA	Environmental Protection Agency
ERM	Environmental Resources Management, Inc.
ESD	Explanation of Significant Differences
FFS	Focused Feasibility Study
MCL	Maximum Contaminant Level
MW	Monitoring Well
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	Operations and Maintenance
PADEP	Pennsylvania Department of Environmental Protection
PADER	Pennsylvania Department of Environmental Resources
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objective
RBC	Risk-Based Concentration
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SDWA	Safe Drinking Water Act
TCA	1,1,1-Trichloroethane
TCE	Trichloroethylene
VOC	Volatile Organic Compound

**U.S. Environmental Protection Agency  
Region III  
Hazardous Site Cleanup Division  
Second Five-Year Review Report  
Bally Ground Water Contamination Superfund Site  
Borough of Bally, Berks County, Pennsylvania**

**I. Introduction**

The purpose of the Five-Year Review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them.

The United States Environmental Protection Agency (EPA or "the Agency") is preparing this Five-Year Review report pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121 and the National Contingency Plan (NCP). CERCLA §121 states:

*If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f) (4) (ii) states:

*If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

EPA Region III conducted this Five-Year Review of the remedy implemented at the Bally Ground Water Contamination Superfund Site (Site) located in the Borough of Bally, Berks County, Pennsylvania. This review was conducted by the Remedial Project Manager (RPM) for the Site from January 2005 through June 2005. This report documents the results of the Five-Year Review. This is the second Five-Year Review for the Site. The triggering action for this statutory review is the date of the first Five-Year Review: June 8, 2000. The Five-Year Review is required because hazardous substances, pollutants, or contaminants remain at the Site above levels that would allow for unlimited use and unrestricted exposure.

## II. Site Chronology

Table 1 lists the chronology of events for the Site.

**Table 1: Chronology of Site Events**

<b>Date</b>	<b>Event</b>
October 1982	Volatile organic compound contamination was identified in Bally's Municipal Well Number Three, one of three sources of potable water used by Borough of Bally.
December 1982	Municipal Well Number Three is disconnected from the Bally water system.
1987	EPA enters into a Consent Order with Bally Engineered Structures, a potentially responsible party for the contamination, to perform a remedial investigation/feasibility study.
October 1987/March 1989	PADEP issues a permit for the operation of a two-stage air-stripper water treatment system at Municipal Well Number Three. Municipal Well Number Three is reconnected to the Bally water system.
June 1989	EPA issues the Record of Decision for the Site.
January 18, 1990	EPA issues an Explanation of Significant Differences for the Site, clarifying EPA's position with regard to air emissions from the on-Site air-stripper water treatment system.
May 28, 1999	EPA issues the Preliminary Close-Out Report for the Site.
February 2003	1,4-dioxane is identified at Municipal Well Number Three and in the Bally water system.
March/April 2004	Trichloroethylene vapors are identified beneath the building slab of the former Bally Engineered Structures facility, triggering the initiation of a vapor intrusion investigation at the Site.

## III. Background

### Physical Characteristics

The Site is located in the Borough of Bally, Berks County, Pennsylvania. The Site consists of the former Bally Engineered Structures (BES) facility ("the facility") and a plume of ground water contamination originating from the BES facility and extending underneath a portion of the Borough of Bally ("the plume"). The facility and the plume are further described below.



## Facility

The former BES facility was an industrial production plant operated between the 1930's and approximately 1995. After industrial operations were ceased at the facility in approximately 1995, the property and structures were sold to an entity called "GBI Bally Brooke", who subdivided the facility buildings for use by small businesses. The facility is currently occupied by the following tenants/operations:

- Hunsinger Plastics/plastics extrusion
- L&Z storage/storage of textiles and gloves
- Impress Industries/warehousing of packaging materials
- Great American Weaving/weaving of ribbons and related materials
- Gregory's Woodworking/construction of wooden cabinets
- S&W Metal Products/fabricating metal products
- T&G Packaging/refurbishing of pharmaceutical machines
- Curves/exercise gym

Historical operations at the facility are described below (see "History of Contamination").

## Ground Water Contamination Plume

The plume consists of ground water exhibiting Site-related contaminant concentrations in excess of the performance goals listed in the Record of Decision (ROD). These performance goals were based on the levels set forth in a Pennsylvania Department of Environmental Protection (PADEP) Municipal Water Supply Permit and Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs). The most contaminated portion of the plume lies between the former BES facility and Bally Municipal Well Number Three (MW#3). The remainder of the plume extends to the southeast, generally following topography and a "stream valley" formed by unnamed tributaries of the West Branch of the Perkiomen Creek ("West Branch"). The portion of the ground water contamination plume that lies to the north of Route 100 (which approximately bisects Bally from east to west) is identified as the "Northern Area", and the portion of the plume to the south of Route 100 is identified as the "Southern Area".

A map depicting the location of the BES facility and the extent of the ground water contamination plume, based on the most recent ground water monitoring data for the Site, is included in Attachment 1 (Site Map).

Review of the 1989 ROD reveals that the Site is underlain by a single, thick, unconfined (or locally semi-confined) aquifer that occurs within the limestone fanglomerate and overlying residuum. Transmission of ground water is principally controlled by secondary porosity caused by fractures, joints, and solutioning activity.

The aquifer is a current and potential source of drinking water as described below (see "Land and Resource Use").

## **Land and Resource Use**

The former BES facility continues to be used by various tenants for light industrial, commercial, and shipping and receiving activities.

Land use in the vicinity of the Site is primarily residential, with commercial and industrial properties present, as well as parks, recreation fields and local government facilities. The Borough of Bally covers 330 acres and has a population of approximately 1,062 people.

The aquifer underlying the Site is currently used as a drinking water source for residents in the Borough of Bally and adjoining Washington Township. The drinking water supply for the Borough of Bally and a portion of Washington Township is currently a municipal supply well located inside the Borough limits, and identified as MW#3. MW#3 has been contaminated by the Site-related ground water contamination plume. An air-stripper treatment system ("air-stripper") is currently operated at MW#3 to remove Site-related contaminants from the well water before the water is delivered to residents. The Site-related contaminant "1,4-dioxane", which was identified in the Bally water system during February 2003 (see Section V, below), is not removed by the air-stripper. Residents of Washington Township which are not served by MW#3 use private wells.

The direction of ground water flow in the bedrock aquifer is generally to the east.

## **History of Contamination**

In 1982, the Bally Municipal Water Authority conducted a water quality check of the Bally water system and discovered the presence of elevated concentrations of chlorinated volatile organic compounds (VOCs) in MW#3. Review of the ROD reveals that the principal VOCs identified in the impacted aquifer were 1,1,1-trichloroethane (1,1,1-TCA), trichloroethylene (TCE), and 1,1-dichloroethene (1,1-DCE). A survey conducted in 1983 by the Pennsylvania Department of Environmental Resources (PADER, now the Pennsylvania Department of Environmental Protection (PADEP)) indicated that the BES facility was a potential source of the VOC contamination.

The former BES facility is located on a tract of approximately 19 acres, immediately to the west/southwest of MW#3. BES operated between 1972 and approximately 1995, constructing insulated structures and structural panels. The predecessor of BES, Bally Case and Cooler Company (BCC), the original owner of the facility, started manufacturing wood products at the facility in the 1930's. In 1950, BCC began manufacturing porcelain-finished, insulated meat display cases and insulated panels. Initially, the insulation material consisted of fiberglass batting, but in the early 1960's urethane foam was substituted. Use of degreasing agents at the BCC facility was concurrent with the switch to urethane as the display case insulating material. Degreasing solvents were used to clean metal surfaces to ensure a good bond with the urethane foam insulation, as well as to degrease small metal parts used in interlocking the panels to form insulated structures. Degreasing operations were reportedly performed in two degreasing areas:

- Degreasing of porcelain shells was performed using a 2,000-gallon tank at the “former degreasing area”, located in the southeastern portion of the facility. Prior to the application of the porcelain shells and the foam insulation, an overhead monorail crane was used to dip the entire case into the tank. Following dripping, the cases were set on the floor and permitted to dry before being returned to the production line. The only solvent used in the former degreasing area was TCE. Use of this degreasing tank was discontinued in approximately 1969, concurrent with the end of case manufacturing operations.
- A second degreasing area, known as the “small parts degreasing area” was in use in the early 1960’s for degreasing small parts used in interlocking the insulated panels. The tank at this location had a capacity of 600 gallons, but facility personnel have indicated that the tank usually contained less than 400 gallons of solvent. There was no reference in the plant operating records to the use of specific degreasing solvents at the small parts degreasing tank prior to 1980.

Additionally, solvents have also historically been used as flushing agents to clean molds and urethane foam injection nozzles between mold shots. This activity had been ongoing since the initial use of urethane foam in the production process in the mid-1960’s.

### **Initial Response**

As mentioned above, VOC contamination was identified in MW#3 during October 1982. MW#3 was removed from the Bally water system in December 1982. A water treatment system, consisting of two air-stripper towers, was constructed to treat water from MW#3 in 1988/1989, and MW#3 was reconnected to the Bally water system in 1989. Between 1982 and 1989, the Bally water system received water from a second municipal well (identified as “Municipal Well Number One (MW#1)”) and from springs. MW#1 was also contaminated by VOCs between 1982 and 1988. After MW#3 was reconnected to the Bally water system in 1989, MW#1 was removed from service. In addition, the use of springs to obtain water for the Bally water system was discontinued between 1982 and 1989. Therefore, since 1989, the Bally water system has received water exclusively from MW#3.

Additional studies of the aquifer contamination issue were performed in 1983 by PADER and EPA. Although unaware of sources of VOC contamination resulting from their activities, BES met with PADER in 1984 and retained Environmental Resources Management, Inc. (ERM) in 1985 to perform aquifer characterization studies to determine the source of contamination of MW#3. The results of the ERM study, dated October 1986, indicated that the BES plant was a likely source of the VOC contamination noted in the aquifer in the vicinity of the BES facility.

In 1987, EPA entered into a Consent Order with BES, a potentially responsible party (PRP) for contamination at the Site, to conduct a study on the nature and extent of contamination at the Site and to evaluate alternative technologies for cleanup. This study was completed in 1989.

## **Basis for Taking Action**

The Final Phase III Remedial Investigation (RI) Report is dated May 1989. The results of the RI are summarized as follows:

### Impacts to Ground Water

The ground water investigation in the RI consisted of the sampling of 18 monitoring wells, two municipal wells, four industrial wells (including the BES well), and 11 residential wells. VOCs were detected in 13 of the monitoring wells, the two municipal wells, three of the industrial wells, and one residential well. Review of the RI report reveals that the shallow portion of the ground water contamination plume, present in unconsolidated subsurface materials, was limited in horizontal extent. The deeper portion of the plume, present in bedrock, was much larger in horizontal extent and exhibited higher concentrations of VOCs. The extent of the deep portion of the plume, as mapped in the RI, extends from the BES facility, to the northeast as far as MW#1, and to the southeast. The downgradient edge of the plume to the southeast is mapped as "inferred", and was not confirmed by sampling and analysis during the RI.

### Impacts to Surface Water

Review of the RI reveals that Site-related contaminants were identified in a surface water sample and sediment sample collected from an unnamed tributary located downstream from the former BES facility. The RI report indicated that additional sampling may be necessary to determine if the downstream contamination was a result of the seepage of contaminated ground water. The ROD indicates that the surface water VOC concentrations were found to be below applicable criteria for the protection of aquatic biota.

### Sources of contamination at the former BES facility

The RI report included an evaluation of potential contamination source areas at the former BES facility. Soil samples were collected during the RI from the following potential source areas at the facility: former degreasing area, small parts degreasing area, northern and southern lagoon areas, and northern perimeter of the BES facility. Review of the ROD reveals that no specific source of contamination was identified at the former BES facility. It was concluded that the ground water contamination plume associated with the Site is a result of a historic release from the former BES facility.

## **IV. Remedial Actions**

### **Remedy Selection**

#### 1989 ROD

On June 30, 1989, EPA signed the Record of Decision (ROD), which documented the selected remedy for the Site. The remedy was comprised of the following components:

- Abandoning appropriate existing private wells and implementing institutional controls on the use of operable private wells and the construction of new wells.
- Performing ground water and surface water monitoring to measure contaminant concentrations and migrations effected by removing contaminated ground water from the aquifer through the continuous pumping of MW#3.
- Treating the extracted ground water by one of the treatment options retained for consideration and discharging the treated water from MW#3 to the adjacent stream or into the Borough of Bally potable water system as needed to provide a suitable alternative water supply.
- Performing necessary additional studies in the pre-design phase to evaluate the configuration of any additional ground water extraction well(s) required.

The remedial action objectives outlined in the ROD for the cleanup of the Site are:

- Prevent current and future ingestion of ground water containing unacceptable levels of VOCs.
- Restore the aquifer within a reasonable time frame to a condition such that levels of the VOC contaminants of concern are below remediation levels consistent with its use as a Class II aquifer.

The performance standards which are to be met by the execution of the remedy at the Site are listed in the ROD. For ground water, the performance standards are based on a PADEP Municipal Water Supply Permit and SDWA MCLs. The performance standards for surface water are based on a PADEP National Pollutant Discharge Elimination System (NPDES) permit for the effluent from the air-stripper at MW#3. These performance standards are listed in Table 2 of the ROD.

#### ESD #1

On January 18, 1990, EPA issued an Explanation of Significant Differences (ESD) for the remedy at the Site. The ESD modified the ROD as follows:

- Air emission controls are no longer required irrespective of emission levels. The need for air controls is now dependent upon contaminant levels emitted from the air-stripper. Specifically, air emissions must be controlled such that the combined emissions from all

Site-related air-strippers shall not exceed three pounds per hour during any one hour and fifteen pounds per day during any twenty-four hour period.

- Air stripping without air emission controls (ROD process option 2C) may be retained for consideration if, and only if the combined emissions from all site-related air-strippers do not exceed the levels stated in the previous paragraph.
- EPA reserves the right to determine the appropriate number of Site recovery wells and the appropriate design and location for all recovery wells. EPA will also control the withdrawal pumping rate of these wells. The emissions generated under the EPA approved design and operating specifications will in turn dictate the need for air emission controls.

## **Remedy Implementation**

### Well Abandonment

Review of the ROD reveals that the only “private well” that appears to be appropriate for abandonment was identified as the “Gehman Residence”. This well exhibited a total VOC concentration of 304 parts per billion (ppb) during the RI. During the performance of this Five-Year Review, EPA performed an interview with Civil and Environmental Consultants, Inc. (CEC), a consultant under the employ of the PRP. The CEC project manager indicated that to the best of his knowledge, the Gehman well was not permanently closed as part of the remedial action at the Site. Therefore, the PRP should arrange for the closure of the Gehman well in accordance with appropriate State requirements. Based on EPA’s interview with the Bally Borough Manager (see Section VI (Five-Year Review Process), below) this private well is not currently used for potable water. However, the well should be abandoned properly to ensure that it is not used for potable water in the future.

### Institutional Controls

The Borough of Bally passed an ordinance (November 4, 2002, Ordinance #250 – Water & Sewer) which serves as an institutional control at the Site. Review of the ordinance reveals that all water users located in the Borough of Bally (residential and non-residential), and situated so that water service is available, must connect to the Bally water system. In addition the ordinance indicates that no private wells may be drilled in the Borough without applying for a permit from the Borough of Bally. The permit application would be reviewed by the Borough Engineer in cooperation with PADEP. The ordinance specifically indicates that a permit for a new private well in Bally will not be issued if it is determined that the installation of such a well would adversely impact the remedial action being performed at the Site.

EPA interviewed the Bally Borough Manager as part of the Five-Year Review process. The Borough Manager indicated that no residents of Bally use private wells. Rather, all residences within the Borough are connected to the Bally water system. The Borough Manager also indicated that no requests have been received to install new wells within the Borough since she began her tenure as Borough Manager in 2001. The Borough Manager is aware of two industrial

wells and one livestock well that operate in Bally. Based upon a review of ground water monitoring data for the Site, these operating wells do not appear to have caused the plume to extend beyond the boundary of the Borough of Bally, where municipal water service is unavailable. Therefore, the operation of these wells has not impacted the protectiveness of the remedy.

#### Ground water extraction and treatment

In the interim period between the discovery of the VOC contamination at MW#3 (1982) and the issuance of the ROD (June 1989), the PRP arranged for the installation of an air-stripper at MW#3. The air-stripper was installed so that Site-related VOCs could be removed from contaminated well water prior to distribution in the Bally water system. The first air-stripper tower received a Public Water Supply Permit (No. 0687505) to operate from PADEP on October 28, 1987. The second air-stripper tower received an amendment to the Public Water Supply Permit to operate from PADEP on March 24, 1989.

#### Selection of additional extraction wells/Ground water and surface water monitoring

EPA entered into a Consent Decree (CD) with Temrac, Inc. and Sunbeam-Oster Company, Inc. (PRPs) to implement the requirements of the ROD. The CD was entered into the court on July 18, 1991. As the air-stripper at MW#3 was constructed before the issuance of the ROD, the primary activity to be addressed during the remedial design (RD) process was the determination of whether or not additional extraction wells would be required to address the ground water contamination plume.

A Pre-Design Report (dated June 6, 1994) was prepared to evaluate, among other things, the necessity of installation of additional extraction wells south of Route 100. The Pre-Design Report indicated that the existing remedial system, comprised of MW#3 pumping at 260 gallons per minute and an air-stripper, did not capture contaminated ground water south of monitoring well "87-10" (see Attachment 2). As potential receptors (private wells) existed downgradient from the ground water contamination plume that could be impacted in the future, the Pre-Design Report concluded that additional remedial actions south of Route 100 needed to be considered to achieve the goals presented in the ROD. The Pre-Design Report included a preferred method for cleanup of the portion of the ground water contamination plume present south of Route 100, known as the "Southern Area". The preferred method was comprised of the installation of two extraction wells and ground water treatment systems at locations south of Route 100.

Based on a review of EPA records for the Site, the installation of one extraction well on a privately owned property located south of Route 100 was proposed in 1995. The location of this proposed extraction well was believed to be at the downgradient edge of the plume. However, access to the necessary private property does not appear to have been accomplished until August 1998.

In the interim period between 1995 and 1998, the PRPs performed monitoring of ground water

and surface water in the Southern Area of the ground water contamination plume. Based on the results of this monitoring, the PRPs made the following assertions regarding the Southern Area of the plume:

- Although contaminant concentrations in the shallow portion of the bedrock aquifer continued to exceed the performance standards for ground water listed in the ROD, overall contaminant concentrations in the shallow bedrock aquifer were decreasing
- Contaminant concentrations in the deep portion of the bedrock aquifer were less than the performance standards listed in the ROD. Therefore cleanup of the deep portion of the bedrock aquifer had been accomplished.
- The nearest downgradient receptor, a privately owned well used for potable water and watering animals was not impacted by Site-related contaminants.
- Samples of surface water revealed concentrations of Site-related contaminants that exceeded the performance standards listed in the ROD. However, the contaminant concentrations were determined to be less than Risk-Based Concentrations (RBCs) that were calculated for the Site. The RBCs were based on exposure from incidental ingestion and dermal absorption during swimming, which were considered to be the most likely routes of exposure. Based on this information, the concentrations of Site-related contaminants identified in surface water were not considered to represent a threat to human health.
- The continuous pumping of MW#3 had created a ground water capture zone that included the former BES facility, the source of the ground water contamination. This ground water capture zone extended to approximately Route 100, and had effectively separated the Southern Area of the plume from the Northern Area of the plume. Based on this separation of the Southern Area from the source of contamination, it was expected that the Southern Area portion of the plume would achieve compliance with the ground water performance standards without the installation of an active ground water remediation system. The cleanup of the Southern Area of the plume would be effected by natural processes, such as dilution and adsorption.

The PRP's assertions regarding the Southern Area of the plume notwithstanding, when the above-mentioned access issue had been resolved in August 1998, two monitoring wells were installed at the location of the proposed extraction well. These wells are identified as 97-32I and 97-23D, and were constructed to collect ground water samples from the shallow portion and deep portion of the bedrock aquifer, respectively. Ground water samples collected from these wells in October 1998 did not reveal contaminant concentrations in excess of the ROD performance standards.

Based on this information, EPA determined that the installation of additional extraction wells in the Southern Area of the plume was not necessary. This determination was documented in a letter to the PRP, dated March 26, 1999.

EPA documents indicate that the Site achieved construction completion status when the Preliminary Close-Out Report was signed on May 28, 1999.



## **System Operation/Operation and Maintenance**

The current remediation system for the Site consists of MW#3, the two-stage air-stripper connected to MW#3, and a monitoring program which includes influent and effluent from the air-stripper and ground water monitoring.

### **Air-stripper Operation and Maintenance/Monitoring**

The air-stripper associated with MW#3 is operated and maintained by contractors for the PRP and Borough personnel.

The contaminated influent to the air-stripper is sampled once per month. Effluent from the air-stripper is sampled four times per month. These influent and effluent samples are collected by a laboratory.

Issues related to the operation and maintenance (O&M) of the air-stripper at MW#3 were reported between the first Five-Year Review and the second Five-Year Review. Specifically, the Borough of Bally had expressed concerns regarding ice build-up on the air-stripper during extremely cold weather, the lack of an emergency power source at MW#3 and the air-stripper, and the lack of a back-up air-stripper, in the event that the current air-stripper cannot function due to an extended maintenance or repair activity. To respond to these concerns, the PRP has purchased and setup at MW#3 a backup air-stripper system. The backup air-stripper is a "shallow tray" unit which resides in a heated trailer. Therefore, in the event of icing at the main air-stripper, the backup air-stripper can operate until the icing is addressed. The PRP has also performed the necessary electrical work at MW#3 that will allow for a rented emergency power generator to provide electricity to MW#3 and the air-stripper in the event that a loss of power occurs in Bally.

### **Ground Water Monitoring**

Arcadis G&M, Inc. (Arcadis) performs ground water monitoring on behalf of the PRP.

The following monitoring wells are currently included in the ground water monitoring program at the Site:

Annual monitoring: 92-19I, 97-23I

Semi-annual monitoring: 92-17, 92-18I, 92-20I

## **V. Progress Since the Last Five-Year Review**

This is the second Five-Year Review for the Site. The first Five-Year Review for the Site was issued on June 8, 2000. The first Five-Year Report concluded that the remedy implemented at the Site was protective of human health and the environment. The conclusions and recommendations included in the report were to continue ground water monitoring, continue monitoring of effluent from the air-stripper, and to complete minor repairs at the air-stripper. Specifically, because the

air-stripper is exposed to the elements, ice was reported to have formed during the winter at the outlet of the air-stripper. The ice reportedly damaged the exterior insulation of the air-stripper, and a sight glass used for checking water levels in the air-stripper.

The recommendations included in the first Five-Year Review report have been implemented in the interim period prior to this Five-Year Review Report.

However, two issues have been identified between the first Five-Year Review and the Second Five-Year Review: the identification of 1,4-dioxane in MW#3, and potential vapor intrusion. EPA is currently working with the PRP (American Household Inc. (AHI) and Sunbeam Products, Inc.) to resolve each of these issues.

### 1,4-Dioxane

In February 2003, EPA requested that the PRP collect a water sample from MW#3 and analyze the sample for 1,4-dioxane. EPA made this request because of the presence of 1,1,1-TCA in the ground water contamination plume, and because 1,4-dioxane is sometimes associated with 1,1,1-TCA as a solvent stabilizer. The PRP collected water samples directly from MW#3, from a port after the first air-stripper tower, from a port after the second air-stripper tower, and from the first residence hooked up to the Bally water system. 1,4-dioxane was identified in each of the samples at concentrations of approximately 40 to 50 ppb. 1,4-dioxane concentrations do not appear to have been appreciably reduced by air-stripper. EPA performed a risk assessment for 1,4-dioxane in drinking water, and determined that, based on Superfund risk assessment parameters, six parts per billion is equivalent to a 1 in 1,000,000 increase in carcinogenic risk over a lifetime. In approximately March/April 2003, AHI began to provide bottled drinking water to users of the Bally water system who wished to reduce their exposure to 1,4-dioxane.

On September 30, 2003, EPA and Sunbeam Products, Inc. (Sunbeam) entered into an Emergency Administrative Order on Consent (AOC) that required Sunbeam to prepare a focused feasibility study (FFS) to identify options to address the 1,4-dioxane contamination issue. The AOC also required Sunbeam to continue to provide bottled drinking water to users of the Bally water system who requested it.

The first deliverable required by the AOC during the development of the FFS was the FFS workplan. A conditional approval letter was issued for the workplan by EPA on May 27, 2004.

The FFS is currently being prepared by Sunbeam, and is expected to be completed in 2005. The FFS will address the feasibility of treatment of 1,4-dioxane at MW#3, and the feasibility of installing a new public water supply well for Bally in an uncontaminated location.

### Vapor Intrusion

In March/April 2004, at the request of EPA, AHI collected four sub-slab samples of soil vapor ("sub-slab samples") from beneath warehouse/storage areas of the former BES facility. The sub-

slab samples were requested by EPA to evaluate the potential for vapor intrusion at the Site. Concentrations of Site-related contaminants, including TCE, 1,1-DCE, and 1,1,1-TCA, were identified in the soil vapor beneath the facility. Based on these results, Sunbeam prepared a vapor intrusion investigation workplan to evaluate the potential for vapor intrusion at the former BES facility, which is currently used by various small businesses, and at townhomes located adjacent to the east of the facility (between the former BES facility and MW#3). EPA issued a conditional approval of the vapor intrusion investigation workplan on February 14, 2005. The investigation will determine where Site-related contaminants exist in soil vapor beneath the facility and the nearby townhomes, and will determine the need for further sampling or corrective action. It is anticipated that the investigation outlined in the workplan will be performed during 2005.

## **VI. Five-Year Review Process**

### **Administrative Components**

Members of the local government of the Borough of Bally, and PRP representatives of Sunbeam Products, Inc. (Sunbeam) and AHI, and PADEP were notified of the initiation of the Five-Year Review in approximately January/February 2005.

The Five-Year Review Team was led by the EPA Remedial Project Manager (RPM) for the Site.

The review team established the review schedule which included:

- Community Involvement;
- Document Review;
- Data Compilation and Review;
- Site Inspection;
- Local Interviews; and
- Five-Year Review Report Development and Review

### **Community Involvement**

The general public in the vicinity of the Site was notified of the performance of the Five-Year Review by publishing an advertisement in the following newspapers: The Morning Call and The Mercury. Advertisements in these papers were placed by EPA on March 2, 2005. The Morning Call is based out of Allentown, Pennsylvania, and The Mercury is based out of Pottstown, Pennsylvania. These newspapers serve the community in the vicinity of the Site.

Activities to involve the community in the Five-Year Review were initiated by interviewing the following individuals:

1. Bally Borough Manager
2. PADEP Project Manager

During the interviews, representatives of EPA summarized the findings of the Site Inspection and asked for any input on concerns of the protectiveness of the remedy.

Following signature on this Five-Year Review document, a notice will be sent to the above-mentioned newspapers announcing that the Five-Year Review report for the Site is complete, and that the results of the review and the report are available to the public at the information repository for the Site.

## **Document Review**

This Five-Year Review consisted of a review of relevant documents including:

- ROD – Signed June 30, 1989
- ESD#1 – Signed January 19, 1990
- PCOR – Signed May 28, 1999
- Five-Year Review – Signed June 8, 2000

## **Data Review**

The following reports were reviewed during the performance of this Five-Year Review:

- Phase I Investigation, prepared by ERM, prepared for Allegheny International, Inc., dated February 11, 1986.
- Hydrogeologic Investigation of the BES, Inc. Facility, prepared by ERM, prepared for BES, dated October 27, 1986.
- Final Phase III Remedial Investigation Report, prepared by REMCOR, Inc., prepared for Allegheny International, Inc., dated May 1989.
- Report of Findings – Northern Area Investigation, prepared by CEC, prepared for Sunbeam-Oster Company, Inc., dated February 17, 1995.
- Southern Area Monitoring Reports, prepared by CEC, prepared for Sunbeam Oster Company, Inc. or B. Koh & Associates, dated April 2, 1996, December 18, 1996, June 24, 1997, January 30, 1998, July 16, 1998, and February 2, 1999.
- Report on Initial 1,4-dioxane Sampling and Analysis Results, prepared by CEC, dated April 20, 2003.
- Ground water Monitoring Report – March 2003 Sampling Event, prepared by Arcadis, prepared on behalf of AHI, dated June 3, 2003.
- Annual and Semi-Annual Ground water Monitoring Results, prepared by Arcadis, dated June 8, 2004.
- Annual Ground water Monitoring Results, prepared by Arcadis, dated January 11, 2005.
- March 2005 Annual Ground water Sampling results, prepared by Arcadis, dated May 13, 2005.
- Bally Well No. 3 – Discharge Monitoring Reports, prepared monthly by Systems Design Engineering, Inc., prepared for PADEP Water Management Program on behalf of the

Borough of Bally, dated January 2004 through March 2005.

- Technical data provided by the PRP regarding the air-stripper operating at MW#3 (provided February 2005).

### Ground Water

Review of the ground water monitoring data reveals that a plume of contaminated ground water which exceeds the ground water performance standards listed in the ROD continues to exist beneath a portion of the Borough of Bally. One extraction well (MW#3) is used to remove contaminated ground water from the plume for treatment by an air-stripper. Review of the RI report reveals that a ground water sample collected from MW#3 in 1989 exhibited a total VOC concentration (1,1,1-TCA, TCE, 1,1-DCE, etc.) of 1,390 ppb. Review of the December 2004 Discharge Monitoring Report for MW#3 reveals that the total VOC concentration was 1,276 ppb. Therefore, the total VOC at MW#3 has not substantially diminished by constant extraction and treatment of ground water between 1989 and the present. However, based on the ground water monitoring data, the constant extraction and treatment of ground water from MW#3 has limited the extent of the plume. In the downgradient direction (east/southeast) the plume has not extended beyond the ground water monitoring well cluster identified as "97-23I/97-23D", which was installed in 1998.

The following changes are recommended for the ground water monitoring program:

- The monitoring well identified as "97-23D" should be added to the ground water monitoring program for annual sampling and analysis for Site-related contaminants. This well complements the monitoring well "97-23I" in establishing the downgradient location where ground water performance standards are attained.
- Currently, EPA receives only ground water monitoring data from the PRP to document the semi-annual and annual ground water sampling events. Annually, a remedial action progress report should be prepared by the PRP and submitted to EPA for review. This progress report should summarize the results of semi-annual and annual ground water sampling, and discuss the status of the ground water contamination plume. Specifically, the progress report should discuss the horizontal and vertical extent of the plume, and the contaminant concentrations identified in the plume relative to historical plume extent and concentrations. Visual representations of the horizontal and vertical extent of the plume should be included in the progress report. The purpose of the progress report is to allow EPA to evaluate 1) the extent and severity of the plume, and 2) what progress has been made on an annual basis towards achieving the ground water performance standards outlined in the ROD. The remedial action progress report should also include optimization strategies, as appropriate, that the PRP wishes to implement to facilitate cleanup of the ground water contamination plume.

### Surface Water

Site-related contaminants have the potential to enter surface water via two routes: seepage of

contaminated ground water to unnamed tributaries of the West Branch in the Southern Area of the plume, and discharge from the air-stripper to an unnamed tributary of the West Branch.

Surface water sampling from unnamed tributaries of the West Branch, present in the Southern Area of the plume, was performed between 1995 and 1998. Review of the surface water sampling results collected from the Southern Area of the plume did not reveal Site-related contaminant concentrations of concern to human health or the environment.

Discharge from the air-stripper to the unnamed tributary of the West Branch is regulated pursuant to a NPDES permit issued by PADEP. The unnamed tributary lies approximately 100' to 200' west of MW#3. Review of the monthly NPDES Discharge Monitoring Reports prepared during 2004 indicate that treated water discharged to the tributary met the water quality requirements set forth in the NPDES permit.

As part of the FFS, the PRP applied for and received an updated NPDES permit from PADEP in January 2005. The permit (NPDES Permit Number PA 0055123) is effective on February 1, 2005, and expires on February 1, 2010. The permit includes interim effluent limitations for the current discharge location, and final effluent limitations for the current discharge location, and a proposed discharge location at the West Branch, as described below.

The NPDES permit includes interim effluent limitations for a continued discharge from MW#3 to the unnamed tributary. The interim effluent limitations are effective from February 1, 2005 till February 1, 2007. During this period, the PRP is required to perform weekly sampling of effluent from MW#3, and to analyze the effluent samples for methylene chloride, 1,1,1-TCA, TCE, PCE, and 1,4-dioxane. Interim effluent limitations are included in the permit for TCE (average monthly – 3 ppb, maximum daily – 6 ppb), and PCE (average monthly – 0.7 ppb, maximum daily – 1.7 ppb). During this period the PRP is required to monitor and report the results for methylene chloride, 1,1,1-TCA, and 1,4-dioxane, although specific effluent limitations are not provided.

Review of the February 2005 and March 2005 NPDES Discharge Monitoring Reports indicates that the effluent from MW#3 meets the interim effluent limitations specified in the permit.

The NPDES permit also includes final effluent limitations for a continued discharge from MW#3 to the unnamed tributary, and for a proposed discharge location at the West Branch. The final effluent limitations are effective from February 1, 2007 till February 1, 2010. During this period, the PRP is required to perform weekly sampling of effluent from MW#3, and to analyze the effluent samples for methylene chloride, 1,1,1-TCA, TCE, PCE, and 1,4-dioxane. Final effluent limitations are included in the permit for each of the two potential discharge locations: the current discharge location at the unnamed tributary, and a proposed discharge location at the West Branch. The final effluent limitations for the unnamed tributary are: TCE (average monthly – 3 ppb, maximum daily – 6 ppb), PCE (average monthly – 0.7 ppb, maximum daily – 1.7 ppb), and 1,4-dioxane (average monthly – 5 ppb, maximum daily – 10 ppb). The final effluent limitations for the proposed discharge location at the West Branch are: TCE (average monthly – 101 ppb, maximum daily – 202 ppb), PCE (average monthly – 30 ppb, maximum daily – 60 ppb), and 1,4-

dioxane (average monthly – 112 ppb, maximum daily – 224 ppb).

The final discharge location of MW#3 will be evaluated during the FFS. When completed, EPA will review the FFS and EPA intends to select a remedy for the Site that will include a decision on the final discharge location of MW#3. Selection of the remedy will be performed by EPA in accordance with the NCP.

#### Air-stripper

Review of the air-stripper discharge monitoring reports for 2004 (January – December) reveals that the air-stripper removes VOCs from MW#3 well water prior to delivery of that water to the Bally water system or to a nearby unnamed tributary of the West Branch. A sample of effluent from the air-stripper collected on January 14, 2004, exhibited 2.6 ppb TCE. This concentration of TCE exceeds the performance standard listed in the ROD for TCE (1 ppb), which was reportedly referenced from a Municipal Water Supply permit for MW#3. However, as this concentration was below the federal MCL for TCE (5 ppb), and the other weekly samples collected during 2004 exhibited less than 1 ppb TCE, this sample is not expected to represent an unacceptable risk. Well water from MW#3 (pre-treatment) continues to exhibit Site-related VOCs (specifically TCE, 1,1-DCE, 1,1,1-TCA, and tetrachloroethylene (PCE)) at concentrations that exceed MCLs. However, the contaminant “1,4-dioxane” is not removed from well water by the air-stripper. The PRP is currently preparing a FFS to identify options to resolve the 1,4-dioxane contamination issue.

As part of this Five-Year Review, EPA has evaluated VOC emissions from the air-stripper to determine whether or not those emissions pose an unacceptable threat to human health. In support of this evaluation, the PRP provided EPA with data pertaining to the air-stripper, including the physical characteristics of the air-stripper, the rate of contaminated water treated by the air-stripper, etc. EPA performed air-modeling using this data to determine what concentrations of Site-related contaminants in vapor form would be potentially inhaled by downwind human receptors. EPA performed a risk assessment using the air-modeling results. Risk assessment results indicated that the non-cancer risk posed by the air-stripper emissions was well below levels of concern. The cancer risk posed by the air-stripper emissions was determined to be six in 1,000,000. According to the NCP (40 CFR, § 300.430), “For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual between 1 in 10,000 and 1 in 1,000,000 using information on the relationship between dose and response.” The cancer risk associated with the air-stripper emissions lies within the acceptable exposure levels. It should be noted that the risk assessment was performed using conservative risk assessment parameters, specifically with regard to the toxicity of TCE. Based on a review of this information, the emissions from the air-stripper at MW#3 do not pose an unacceptable threat to human health.

#### Performance Standards

The performance standards which are to be met by the execution of the remedy at the Site are

listed in the ROD. For ground water, the performance standards are based on a PADEP Municipal Water Supply Permit and SDWA MCLs. The performance standards for surface water are based on a PADEP National Pollutant Discharge Elimination System (NPDES) permit for the effluent from the air-stripper at MW#3. These performance standards are listed in Table 2 of the ROD (See Attachment 5).

### **Site Inspection**

A Site inspection was performed on April 26, 2005.

The Site inspection was attended by Mr. Mitch Cron, EPA RPM and Mr. Asuquo Effiong, PADEP Project Manager.

The purpose of the inspections was to assess the protectiveness of the remedy. The Site visit included a review of the former BES facility, and MW#3 and the air-stripper.

EPA made the following observations during the site inspections:

During the performance of the vapor intrusion investigation at the former BES facility, EPA noted that a total of nine aboveground storage tanks (ASTs) are currently located at the facility that appear to have been associated with the BES operations. One of the ASTs is located at the exterior of the facility, and is unlabeled. Four ASTs located at the interior of the facility are labeled "isocyanate"; four ASTs also located at the interior of the facility are labeled "resin". Two employees of "GBI Bally Brooke", which currently owns the former BES facility, each indicated that the ASTs have been emptied and do not contain product. Although not an issue strictly related to the Superfund Site, the PADEP Project Manager indicated that the nine ASTs would be referred to the appropriate PADEP program, to confirm that the ASTs have been abandoned in accordance with the appropriate State requirements.

During the Site inspection, MW#3, the air-stripper, and the back-up air stripper all appeared to be in good working order.

### **Interviews**

The following individuals were interviewed during the performance of the Five-Year Review:

Borough Manager: The Borough Manager indicated that she was satisfied with the progress of the cleanup of the Site. However, the Borough Manager did raise specific concerns with regard to the FFS and the future selection of a remedy by EPA to address 1,4-dioxane. Specifically, the Borough Manager raised concerns related to what type of warranty the PRP would provide for a new supply well, in the event that a new supply is installed by the PRP to address the 1,4-dioxane issue. Also, the Borough Manager expressed her concern that in the past the Borough relied upon two wells (MW#1 and MW#3) to provide potable water, whereas if the PRP installs one supply well to address the 1,4-dioxane issue, the Borough's water system would not have a "redundant"



source of water, in the event that the new supply well had a problem. The Borough Manager and the EPA RPM agreed to seek to resolve these issues during the FFS and remedy selection process. The Borough Manager indicated that all residences within the Borough receive water from the Bally water system, not from private wells. The Borough Manager also indicated that no requests have been received to install new wells within the Borough since she began her tenure as Borough Manager in 2001.

PADEP Project Officer: The PADEP project officer was satisfied with the progress of the cleanup of the Site, specifically with regard to the performance of the FFS, and the vapor intrusion investigation.

## **VII. Technical Assessment**

Question A: Is the remedy functioning as intended by the decision documents?

**No.**

As part of the technical assessment of the remedy, the specific remedial action objectives (RAOs) outlined in the ROD were reviewed. The specific RAOs outlined in the ROD for the cleanup of the Site were to:

1. Prevent current and future ingestion of ground water containing unacceptable levels of VOCs.
2. Restore the aquifer within a reasonable time frame to a condition such that levels of the VOC contaminants of concern are below remediation levels consistent with its use as a Class II aquifer.

The first RAO is partially achieved by the use of the air-stripper. Review of 2004 effluent data from the air-stripper reveals that VOCs are removed from well water prior to distribution in the Bally water system. A sample of effluent from the air-stripper collected on January 14, 2004, exhibited 2.6 ppb TCE. This concentration of TCE exceeds the performance standard listed in the ROD for TCE (1 ppb), which was reportedly referenced from a Municipal Water Supply permit for MW#3. However, as this concentration was below the federal MCL for TCE (5 ppb), and the other weekly samples collected during 2004 exhibited less than 1 ppb TCE, this sample is not expected to represent an unacceptable risk.

The compound 1,4-dioxane, a Site-related contaminant, is not removed by the air-stripper prior to distribution in the Bally water system. Therefore, the first RAO has not been fully achieved. The PRP is currently preparing an FFS to identify options to resolve the 1,4-dioxane contamination issue. It should be noted that the PRP has provided bottled drinking water to Bally water system users who wish to limit their exposure to 1,4-dioxane until a permanent solution can be devised.

The second RAO has not yet been achieved.

Each of the elements of the preferred remedy listed in the ROD (see Section IV, above) have been completed with the exception of the proper abandonment of one private well in the Borough of Bally. The private well is not currently being used, therefore, this condition does not affect the protectiveness of the remedy.

#### Optimization Opportunities

The focus of the remedy is the cleanup of the ground water contamination plume using MW#3 as an extraction well, and treating water pumped from MW#3 using an air-stripper. Opportunities may exist for optimizing the ground water cleanup at the Site, perhaps using innovative ground water cleanup technologies that were not widely used or considered when the remedy was selected in 1989. The PRP should consider such optimization opportunities and should recommend optimization strategies, as appropriate, in annual remedial action progress reports.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

**No.**

#### Changes in Standards and To-Be-Considered (TBCs):

The ROD stated that methylene chloride did not have an MCL, and an MCL was not given for 1,2-dichloroethane. Methylene chloride has an MCL of 5 ppb, and 1,2-dichloroethane has an MCL of 5 ppb. The MCLs for TCE, 1,1,1-TCA, PCE, and 1,1-DCE have not changed.

The protectiveness of the remedy would be determined by the protectiveness of the cleanup standards. For groundwater, these were as follows: TCE, 5 ppb; 1,1,1-TCA, 200 ppb; PCE, 5 ppb; 1,1-DCE, 7 ppb; methylene chloride, 5 ppb; and 1,2-DCA, not specified. If these concentrations, along with the MCL of 5 ppb for 1,2-DCA, were achieved, then the risks could be estimated using current methodology and assumptions (see Attachment 4). At these concentrations, the total cancer risk would be approximately 1 in 10,000 and the Hazard Index would be 1 for the child, less than 1 for the adult. It should be noted that this assumes the worst-case draft Cancer Slope Factor (CSFs) for TCE. There are other available draft CSFs that are 20 times or more lower than the CSF that was used in Attachment 4 (the risk conclusions reached in Attachment 4 are likely biased high). Therefore, unless significant amounts of other site-related chemicals were found that are not on this list, the cleanup standards are within the 1 in 10,000 to 1 in 1,000,000 cancer risk goal, and they meet the non-cancer goal of a Hazard Index at or below 1.

#### Changes in Exposure Pathways:

As discussed above, a newly identified contaminant is associated with the Site. The contaminant 1,4-dioxane was identified at MW#3 and in the Bally water system during 2003. The PRP is

performing an FFS under EPA oversight to identify options to resolve this issue.

In addition, townhomes have been constructed adjacent to the east of the former BES facility (the source of ground water contamination). The townhomes are located between the former BES facility and MW#3, therefore, the townhomes overly the ground water contamination plume. In 2004, TCE vapors were identified beneath portions of the BES facility concrete slab. Therefore, the PRP is preparing a vapor intrusion investigation at the Site, to address the BES facility and the townhomes, under EPA oversight.

#### Changes in Toxicity and Other Contaminant Characteristics:

Some toxicity values have changed since 1989. However, the protectiveness of the remedy in groundwater is driven by the cleanup goals, and their protectiveness for drinking purposes is demonstrated in Attachment 4. Risks from vapor intrusion are in the process of being investigated.

#### Changes in Risk Assessment Methods:

New risk assessment guidance has been introduced since 1989. However, the assessment in Attachment 4 evaluates the protectiveness of the cleanup goals for groundwater using current guidance.

#### Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

**Yes.**

Two issues have been identified at the Site that call into question the protectiveness of the remedy: the presence of 1,4-dioxane in the Bally water system, and the potential for vapor intrusion at the facility and at nearby townhomes. The PRP is currently preparing a feasibility study in accordance with an AOC to identify options to address the 1,4-dioxane contamination issue, and investigating the potential for vapor intrusion at the Site in accordance with an EPA-approved workplan.

#### **Technical Assessment Summary**

Based on the results of the Five-Year Review process, two issues that require resolution have been identified that impact the protectiveness of the remedy: the identification of 1,4-dioxane in the Bally water system, and the identification of vapor intrusion as a potential issue of concern at the Site.

## VIII. Issues

**Table 2- Issues**

<b>Issue</b>	<b>Currently Affects Protectiveness (Y/N)</b>	<b>Affects Future Protectiveness (Y/N)</b>
1,4-dioxane in Bally water system	Yes	Yes
Potential for vapor intrusion	Unknown	Unknown
Gehman well is not properly closed	Yes	Yes
Monitoring well 97-23D should be added to the ground water monitoring program	No	Yes

## IX. Recommendations and Follow Up Actions

**Table 3- Recommendations**

<b>Issue</b>	<b>Recommendations and Follow-up Actions</b>	<b>Party Responsible</b>	<b>Oversight Agency</b>	<b>Milestone Date</b>	<b>Affects Protectiveness (Y/N)</b>
1,4-dioxane in Bally water system	Complete FFS	PRP	EPA	2005	Y
Potential for vapor intrusion	Complete Vapor Intrusion Investigation	PRP	EPA	2005	Y
Gehman well is not properly closed	Properly close Gehman well	PRP	EPA	2005	Y
Monitoring well 97-23D should be added to the ground water monitoring program	Add monitoring well 97-23D to ground water monitoring program	PRP	EPA	2005	Y

## **X. Statement on Protectiveness.**

The remedy at the site is not protective because 1,4 -dioxane, a Site-related contaminant, was identified in Bally's municipal water system in 2003. The PRP is currently preparing a FFS to address feasible treatments for the contaminant and the feasibility of installing a new supply well in an uncontaminated area. Selection of the remedy will be performed by EPA in accordance with the NCP. The PRP has supplied bottled water to residents that requested it.

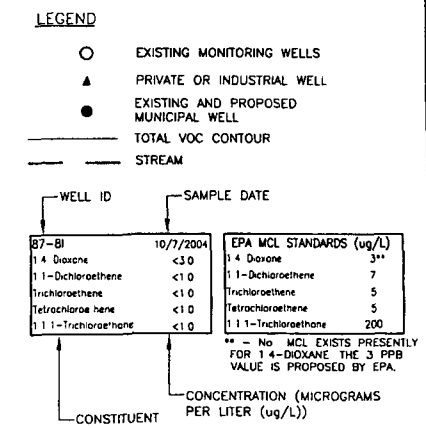
Vapor intrusion is another issue that needs to be resolved before the site can be protective. The PRP will perform a vapor intrusion investigation at the Site in accordance with the EPA approved work plan.

The remedy outlined in the 1989 ROD and subsequent ESD has been implemented, with the exception of properly abandoning one residential well, which is currently not in use. The well will be properly abandoned by the PRPs in the near future.

## **XI. Next Five-Year Review.**

The next Five-Year Review will be completed no later than five years after the signature date of this Five-Year Review.

## ATTACHMENT 1





## ATTACHMENT 2

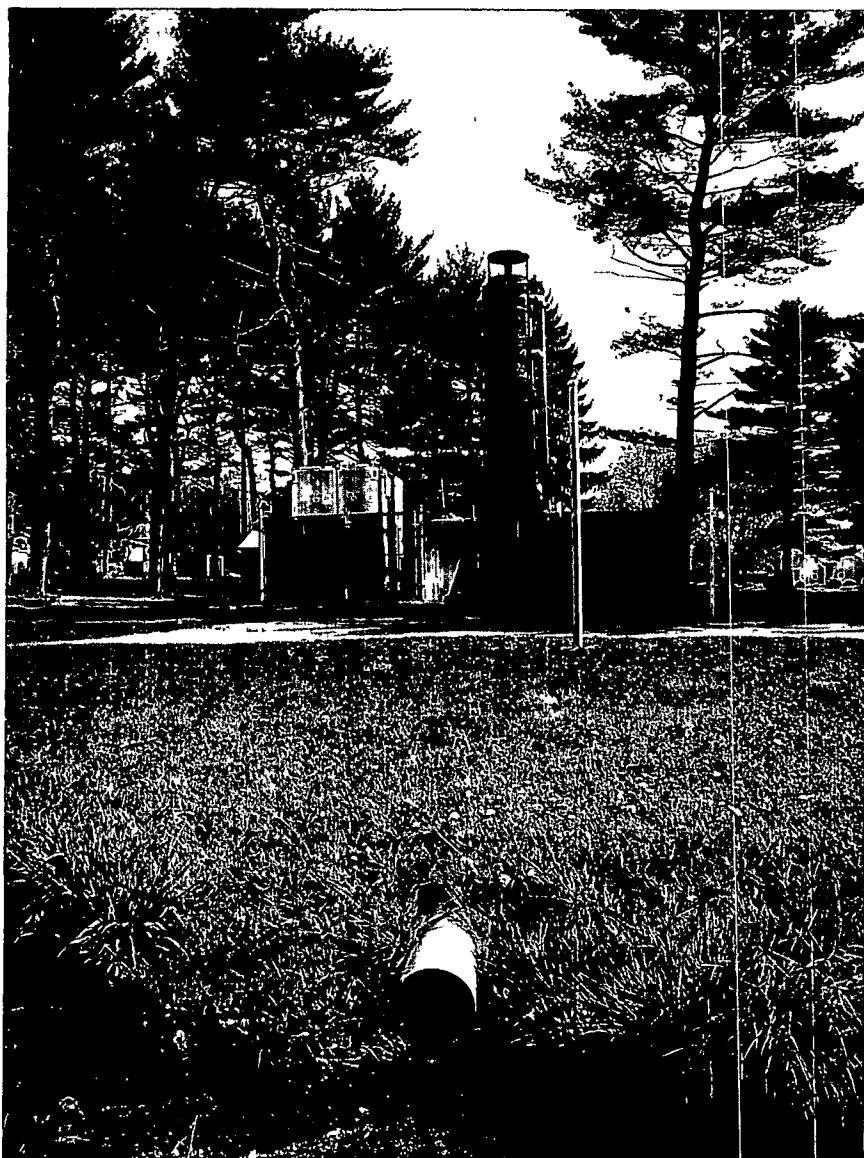


## ATTACHMENT 3

1  
2  
3  
4



Photograph of the air-stripper treatment system present at Bally Municipal Well Number Three.



Photograph of the air-stripper treatment system outfall into an unnamed tributary of the West Branch of the Perkiomen Creek.

## ATTACHMENT 4

## Appendix A

### Risk Assessment of MCLs as Cleanup Goals

The attached spreadsheets demonstrate risk estimation for people consuming water at the MCLs for trichloroethene (TCE), 1,1,1-trichloroethane (111TCA), tetrachloroethene (PCE), 1,1-dichloroethene (11DCE), 1,1-dichloroethane (11DCA), methylene chloride (MC), and 1,2-dichloroethane (12DCA). In reality, it is likely that when groundwater cleanup standards are achieved, the concentrations will be even lower. However, to demonstrate protectiveness at the MCLs, this assessment shows the risk for all MCLs simultaneously.

The ingestion assessment equation was from the EPA "RAGS A" guidance. The dermal assessment came from "RAGS E." The inhalation assessment was from Foster and Chrostowski, 1987. Showering was assumed to occur only for adults; children were assumed to take baths and have generally lower (unquantified) inhalation exposure.

Most of the default exposure assumptions were from the 1991 Standard Default Exposure Factors guidance, RAGS E, or the 1997 Exposure Factors Handbook. The showering model also included the following inputs: a shower room volume of 12 m<sup>3</sup> (based on professional judgment, considered to represent an average bathroom), a drop time of 0.5 seconds (based on CPF Associates, 2003), and a shower flow rate of 10 L/min (based on professional judgment, which incorporates considerations of reported flow rates in the 1997 Exposure Factors Handbook). Henry's Law constants were obtained from the 1996 Soil Screening Guidance. For dermal exposure to adults, the available groundwater concentration was considered to be the initial concentration minus the amount volatilized out (C<sub>wd</sub>, the concentration leaving the water droplet).

Most RfDs and CSFs for inhalation were obtained by adjusting the RfCs and IURs for 20 m<sup>3</sup>/day inhalation and 70 kg body weight. However, because these were the same assumptions used to estimate the risk, the risks would be virtually identical whether estimated using RfDs/CSFs or RfCs/IURs. The toxicity factors were obtained from the following sources:

Chem	Oral/derm RfD	Source	Oral/derm CSF	Source	Inhal RfD	Source	Inhal CSF	Source
TCE	3E-4	E	0.4	E	0.01	E	0.4	E
111TCA	0.28	E	--	--	0.63	P	--	--
PCE	0.01	I	0.54	C	0.14	E	0.02	C
11DCE	0.05	I	--	--	0.06	I	--	--
11DCA	0.1	H	--	--	0.14	H	--	--
MC	0.06	I	7.5E-3	I	0.86	H	1.65E-3	I
12DCA	0.02	E	0.091	I	1.4E-3	E	0.091	I

E = National Center for Environmental Assessment

I = Integrated Risk Information System

USEPA, Office of Solid Waste and Emergency Response (OSWER), 2003.  
Correspondence from Elizabeth Southerland, Deputy Director, Office of Emergency and Remedial Response, to Marcia L. Bailey, Environmental Toxicologist, EPA Region X, concerning cancer risks from tetrachloroethene (PCE). OSWER No. 9285.7-75. June 12.

USEPA, Office of Superfund Remediation and Technology Innovation (OSRTI), 2005.  
Provisional Peer-Reviewed Toxicity Value (PPRTV) for 1,1,1-trichloroethane RfC.  
<http://hhpprtv.ornl.gov/index.shtml>







## INHALATION EXPOSURE

### EQUATIONS

$$k_g = k_H \times \text{SQRT} (MW_H / MW)$$

$k_H$  = GAS-FILM MASS TRANSFER COEFFICIENT (CM/HR)

$k_H$  =  $k_g$  FOR WATER (CM/HR 3000)

$MW_H$  = MOLEC WT FOR WATER (G/MOL 18)

$MW$  = MOLECULAR WT (G/MOL)

$$k_l = k_C \times \text{SQRT} (MW_C / MW)$$

$k_l$  = LIQUID-FILM MASS TRANSFER COEFFICIENT (CM/HR)

$k_C$  =  $k_l$  FOR CARBON DIOXIDE (CM/HR 20)

$MW_C$  = MOLEC WT FOR CARB DIOXIDE (G/MOL: 44)

---

$$K_L = 1 / [ (1 / k_l) + ((R \times T) / (H \times k_g)) ]$$

$K_L$  = MASS TRANSFER COEFFICIENT (CM/HR)

$R$  = GAS CONSTANT (ATM M3/MOL K 8.2E-5)

$T$  = ABSOLUTE TEMP (K 293)

$H$  = HENRY'S LAW CONSTANT (ATM M3/MOL)

$$K_{aL} = K_L / \text{SQRT} [ (T_1 \times U_S) / (T_S \times U_1) ]$$

$K_{aL}$  = ADJUSTED OVERALL MASS TRANS COEFF. (CM/HR)

$T_1$  = CALIB WATER TEMP OF  $K_L$  (K)

$T_S$  = SHOWER WATER TEMP (K)

$U_1$  = WATER VISCOSITY AT  $T_1$  (CP)

$U_S$  = WATER VISCOSITY AT  $T_S$  (CP)



[illegible]



[illegible]

## INHALATION EXPOSURE

### EQUATIONS

$$k_g = k_H \times \text{SQRT} (MW_H / MW)$$

$k_g$  = GAS-FILM MASS TRANSFER COEFFICIENT (CM/HR)

$k_H$  =  $k_g$  FOR WATER (CM/HR 3000)

$MW_H$  = MOLEC WT FOR WATER (G/MOL 18)

$MW$  = MOLECULAR WT (G/MOL)

$$k_l = k_C \times \text{SQRT} (MW_C / MW)$$

$k_l$  = LIQUID-FILM MASS TRANSFER COEFFICIENT (CM/HR)

$k_C$  =  $k_l$  FOR CARBON DIOXIDE (CM/HR 20)

$MW_C$  = MOLEC WT FOR CARB DIOXIDE (G/MOL 44)

---

$$K_L = 1 / [ (1 / k_l) + ((R \times T) / (H \times k_g)) ]$$

$K_L$  = MASS TRANSFER COEFFICIENT (CM/HR)

$R$  = GAS CONSTANT (ATM M3/MOL K  $8.2 \times 10^{-5}$ )

$T$  = ABSOLUTE TEMP (K 293)

$H$  = HENRY'S LAW CONSTANT (ATM M3/MOL)

$$K_{aL} = K_L / \text{SQRT} [ (T_1 \times U_S) / (T_S \times U_1) ]$$

$K_{aL}$  = ADJUSTED OVERALL MASS TRANS COEFF (CM/HR)

$T_1$  = CALIB WATER TEMP OF  $K_L$  (K)

$T_S$  = SHOWER WATER TEMP (K)

$U_1$  = WATER VISCOSITY AT  $T_1$  (CP)

$U_S$  = WATER VISCOSITY AT  $T_S$  (CP)

16/20





20/20

## ATTACHMENT 5

**TABLE 2  
REMEDIATION AND DISCHARGE LIMITS  
DERIVED FROM ARARS**

AR301519

CONTAMINANT CONCENTRATION ARARS (ppm)							
MEDIUM	TCE	TCA	DCE	PCE	METHYLENE CHLORIDE	1,1-DCA	1,2-DCA
Ground Water	0.005 (MCL)(1)	0.2 (MCL)	0.007 (MCL)	0.005 (PMCL)(2)	0.005 (RSD)(3)	NE (4)	NE
Treated Ground Water	0.001 (MWS)(5)	0.2 (MWS/MCL)	0.007 (MWS/MCL)	NE	NE	NE	NE
Surface Water	0.033 (NPDES)(6)	Monitor Only (NPDES)	0.00063 (NPDES)	0.0014 (NPDES)	Monitor Only (NPDES)	Monitor Only (NPDES)	Monitor Only (NPDES)

- AR301517
- (1) MCL - Maximum Contaminant Level
  - (2) PMCL - Proposed MCL
  - (3) RSD - Risk Specific Dose
  - (4) NE - None Established: These compounds have not been detected in Municipal Well No. 3
  - (5) MWS - Municipal Water Supply Permit
  - (6) NPDES - National Pollutant Discharge Elimination System Permit